AUSTRALIA

PATENTS ACT 1990

PATENT REQUEST FOR STANDARD PATENT

I, REGINALD KEITH WHITELEY , being the person identified below as the Applicant, request the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying standard complete specification.

Full application details follow:

Applicant:	REGINALD KEITH WHITELEY
Address:	18 Glenside Street, Balgowlah Heights, New South Wales 2093, Australia
Nominated Person:	AS ABOVE
Address:	AS ABOVE
Invention Title:	"FABRIC CLEANSING COMPOSITIONS AND METHODS"
Name of actual Inventor:	REGINALD KEITH WHITELEY

ASSOCIATED PROVISIONAL APPLICATION DETAILS:

Application Number: PN4155 dated 14th July, 1995

Address for service is: SHELSTON WATERS
60 MARGARET STREET
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Attorney Code: SW

DATED this 8th Day of January, 1996.
REGINALD KEITH WHITELEY

[signature]

[illegible] of SHELSTON WATERS

S 062565 080196

To: The Commissioner of Patents
WODEN ACT 2606

File:18515
Fee: $280.00

NON-CONVENTION - PERSON

P/00/008a
Section 29 (1)
Regulation 3.1(2)

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NOTICE OF ENTITLEMENT

I, REGINALD KEITH WHITELEY of 18 Glenside Street, Balgowlah Heights New South Wales 2093, Australia, being the applicant and nominated person in respect of Application No. 40857/96, state the following:-

1. The person nominated for the grant of the patent is the actual inventor.

2. The person nominated for the grant of the patent is the applicant of the provisional application listed on the Patent Request Form.

.....
(Signature)

24 January 1996
(Date)

File: 18515

SHELSTON WATERS
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AU9640857

(12) PATENT ABSTRACT (11) Document No. AU-A-40857/96
(19) AUSTRALIAN PATENT OFFICE

(54) Title
FABRIC CLEANSING COMPOSITIONS AND METHODS

International Patent Classification(s)
(51)[6] **C11D 003/20** **A01N 025/00** **A61L 002/18** **C11D 003/34**

(21) Application No. : **40857/96** (22) Application Date : **08.01.96**

(30) Priority Data

(31) Number	(32) Date	(33) Country
PN4155	**14.07.95**	**AU AUSTRALIA**

(43) Publication Date : **23.01.97**

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(57) Claim

1. A composition comprising:

(a) a natural or synthetic leather tanning agent,

(b) a surfactant, and

(c) a buffer system comprising one or more non-oxidising acids, which is capable of maintaining the pH of the composition when in solution between 2.5 and 7.0..

2. A composition according to claim 1, wherein the tanning agent is selected from the group consisting of tannic acid, cresol sulphonic acid salt, melamine formaldehyde sulphonate, polyphenolic formaldehyde sulphonate and multiphenol formaldehyde sulphonate.

4. A composition according to claim 3, wherein the surfactant is selected from the group consisting of sodium linear and branched chain dodecyl benzene sulphonates, sodium alkyl naphthalene sulphonates, sodium alkyl (C8-18) sulphates, primary and secondary alkyl (C8-18) sulphonates, alkyl (C8-16) diphenyl oxide disodium sulphonates and alkyl (C3-8) mono and disodium sulphonates thereof, and their stable acidic forms.

AUSTRALIA

PATENTS ACT 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

Name of Applicant: **REGINALD KEITH WHITELEY**

Actual Inventor: **REGINALD KEITH WHITELEY**

Address of Service: SHELSTON WATERS
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SYDNEY NSW 2000

Invention Title: **"FABRIC CLEANSING COMPOSITIONS AND METHODS"**

Details of Associated Provisional Application No. PN4155 dated 14 JULY, 1995

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

TECHNICAL FIELD

The present invention relates to a composition and method for removing, reducing the occurrence of or inactivating allergenic substances from carpets, furnishings and other fabrics. The present invention was developed to provide for the first time a simple, practical and effective means of cleaning and simultaneously disinfecting fabrics against vegetative microbes, living insects and mites and their eggs and most other household pests that find a habitat in these classes of fabrics. The chemical treatments described also provide long term residual action to prevent or greatly reduce the opportunity for microbes, insects, mites and other vermin to reinfect such fabrics. The products further facilitate removal and/or inactivation of allergenic materials such as excreta and other potentially allergenic materials deposited on or within household fabrics by microbes and vermin. The exudates and dander from household animals, a well known source of allergenic substances, are also largely removed by the treatments described herein.

BACKGROUND

Household fabrics such as carpets and other furnishing fabrics, and to a lesser extent commercial furnishing fabrics, are increasingly recognised as a major reservoir of unwanted micro-organisms and other pests, which in turn contribute to the accumulation in the fabrics during normal use of potentially allergenic soiling materials These in turn pose an increasing health hazard for people who regularly occupy carpeted or otherwise furnished dwellings. It is now claimed authoritatively that in Australia and New Zealand up to forty percent of young children aged from six weeks to six months, who are rested and play on domestic carpet, are likely to become permanently sensitised to allergenic materials within the carpet pile. Such exposure and sensitisation is likely to promote asthma and other allergic conditions in later life.

As current science explores the parameters of allergy-induced illness and its causes, additional chemicals, both natural and synthetic in origin, are being identified as having a significant allergenic potential. Domestic pets such as cats, dogs and some common birds, as well as commonly encountered pests and vermin such as cockroaches, are thought now to be responsible for depositing on or in household fabrics significant allergens, possibly more active than the allergens deposited by the household dust mite. Even with the common species of dust mite found in Australia and New Zealand, the faeces of house dust

mite are now known to contain up to thirty five different chemicals, each potentially allergenic to humans. The list of found allergens in the household environment continues to grow with time.

Soiling that enters carpeting and other fabrics during normal uses accumulates, in addition to unsightly coloured soiling materials, a wide range of natural and synthetic chemicals from domestic, industrial, atmospheric and tracked sources. Many other carpet fouling materials are also capable of inducing allergic responses, especially bacterial and fungal spores, pollens from native and planted fauna, motor vehicle exhaust and cigarette smoke.

The achievement and maintenance of a clean and healthy carpet and other furnishing fabrics is quite complex. Cleaning for example a carpet to attain an acceptable level of appearance is now a relatively simple matter, especially where the latest detergent chemicals, cleaning machinery and accessories are used as directed in Australian & New Zealand Standard AS 3733-95 (Revision, 1 August 1995). However, an acceptable appearance level after cleaning must never presume a carpet free from microbes, insects, mites and allergenic materials.

What is being increasingly revealed is that the present methods of maintaining household fabrics and furnishing are not wholly effective in removing the wide range of organic soiling materials that usually accumulate with time. The result is that household fabrics, which include carpets, upholstery, curtains, fabric coverings, bedding components and coverings and both mats and loose floor coverings, as they age and wear often progressively accumulate the more difficult to remove soiling materials. These latter soiling materials may, and frequently do, present a health hazard to the occupants, especially young children.

A most serious and persistent problem is the removal of proteinaceous materials that are deposited within fabrics either from normal household dust, shed skin fragments, many classes of food residues and both the remnants and excreta of micro-organisms resident and multiplying within household fabrics. Regular cleaning by aqueous systems will generally remove some of these latter materials, however, wet cleaning by the normally recommended injection cleaning method will not kill living mites or their eggs within carpet piles. A large part of the faecal debris deposited by mites is allergenic

materials. Within weeks of wet cleaning the quantity of allergen returns to the original level due to continued infestation from mites and their eggs that survived the cleaning process.

Many different methods of cleaning carpets have been evaluated to determine effectiveness both for cleaning and allergen removal in both domestic and commercial situations. These were well reviewed by M J Coltoff *et al.* (Clinical and Experimental Allergy, 1992, Volume 22, 2-28). The best of the systems tested, a product by the name of Allerite, removed most of the dust mite allergen during cleaning (P Fell *et al*, Lancet, 1992, Volume 340, 788-789), wherein an ongoing 67% reduction of allergen was achieved by regular wet cleaning using Allerite.

However, of the many chemicals tried as dust mite allergen suppressants, tannic acid has proved by far the most effective to date. The Australian developed product Allersearch DMS (W F Green, Lancet, 1984, 2:160-2) is based on a mixture of tannic acid and benzyl alcohol in an alcoholic solution. This composition is of limited effectiveness. Apart from being flammable, it inactivates allergens and kills living mites only under clean conditions, ie. fabric that is only very lightly soiled and preferably freshly cleaned at the time of application. The miticidal and allergen-suppressant effects of this product are temporary due to two factors. Firstly the benzyl alcohol, the acaricide, evaporates to air within several days of application. Secondly residual tannic acid is slowly inactivated by soiling subsequent to application and by air oxidation. Regular re-application of tannic acid can lead to discolouration of light coloured fabrics. There have also been reports of sensitivity to benzyl alcohol after repeated use.

A further factor which limits the effectiveness of alcohol-based tannic acid preparations is the lack of adequate penetration of the fabric, largely due to surface chemistry. Whereas adequate penetration can be achieved with thin fabrics, the problem is particularly pronounced in deep pile fabrics such as carpets, particularly when fouled with typical household soils.

Australian patent application AU 577 874 also describes an anti-allergenic composition containing tannic acid and a miticidal alcohol such as ethanol or benzyl alcohol. Significantly, this patent discloses the fact that the effectiveness of tannic acid as an anti-allergenic agent is severely reduced in the presence of an alkaline laundry detergent

and it is suggested that a detergent treatment, if required, should be performed after the treatment with tannic acid. The fact that alkaline detergents reduce effectiveness of tannic acid, prevents effective formulation of cleaning compositions containing tannic acid and commonly used cleaning agents such as detergents and surfactants or their application prior to the use of tannic acid.

Several different formulations of benzyl benzoate have been evaluated and promoted for control the growth of dust mites but these also have encountered serious practical limitations in use and are largely deemed unsuccessful. Patent literature reveals that many other approaches have been attempted to control and/or eradicate allergens and insects from carpets and other furnishing fabrics but to this date none have been recognised in contemporary medical literature as effective.

While many approaches have been evaluated to achieve and maintain clean and hygienic carpets and other furnishing fabrics, a successful product or process has not yet been demonstrated as acceptable or suitable as a simple routine method of total hygiene control. There is thus a need for a composition and a method for removing, inactivating, or at least substantially reducing the levels of soiling materials, particularly allergenic substances, which accumulate in furnishing fabrics during normal use and which may potentially pose a health hazard.

Accordingly it is an object of the present invention to provide means for avoiding or at least ameliorating some of the disadvantages of the prior art.

SUMMARY OF THE INVENTION

The present invention discloses a novel composition and a method which are capable not only of effectively cleaning household and commercial furnishing fabrics but also of neutralising allergenic matter which may be deposited in the course of normal use of the fabrics and destroying live organisms which contribute to the deposition of allergenic matter. The composition is formulated so that a tanning agent can be combined with a surfactant without loss of anti-allergenic activity of the tanning agent while at the same time being able to effectively penetrate the fabric requiring treatment. The method disclosed makes use of the composition alone or in conjunction with other compositions to enable optimal cleaning and removal or inactivation of allergenic matter, together with

means of prolonging the effects of the compositions and maintaining the level of hygiene of the treated fabrics.

In a first aspect the present invention consists in a composition comprising:

(a) a natural or synthetic leather tanning agent,

(b) a surfactant, and

(c) a buffer system comprising one or more non-oxidising acids, which is capable of maintaining the pH of the composition when in solution between 2.5 and 7.0.

In a preferred embodiment the composition further comprises a polar solvent such as a glycol, ketone, alcohol or a pyrollidine based solvent. A natural or synthetic terpene solvent may also be included in the formulation of the composition. Thus the composition can be aqueous or solvent based, depending on the ingredients and the uses of the composition. The composition of the invention can also be prepared as a concentrated solution which may be diluted before application.

In a second aspect the present invention consists in a method of cleaning and/or reducing allergen load of furnishing fabrics comprising the step of treating the fabric with a composition according to the first aspect.

In a preferred embodiment the method further comprises the steps of rinsing the fabric with water and applying a biocidal treatment comprising one or more natural or synthetic terpene solvents, an insecticide, one or more acaricides, one or more biocides, one or more biocidal growth regulators and an emulsifier/surfactant.

One variation of the method involves the application of the biocidal treatment as the first step, followed by the rinsing step and application of the composition according to the first aspect.

The compositions and the rinse can be applied hot or cold but the application of hot solutions is preferred.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The composition of the invention, which will also be referred to as ALLERSPRAY, consist of a mixture in stable aqueous solution of the following ingredients:

(a) a natural or synthetic leather tanning agent, or mixtures thereof, having the ability to react with otherwise inactivate allergen proteins that promote allergies.

(b) a surfactant system to promote penetration of soils and allergen deposits. This will be optimally effective at the operative pH of the solution as applied to textile fibre surfaces, namely 2.5 to 7.0.

(c) a buffer system based on low molecular weight organic or hydroxy acid and/or a detergent acid and a monovalent metal ion or amine.

Optionally, the composition may also contain a glycol, ketone, alcohol or a pyrollidine based polar solvent to assist in cleaning processes and in solubilising in aqueous solution the natural or synthetic tanning agents and other ingredients.

Tanning Agents

The tanning agent will be either a natural substance such as, but not limited to, tannic acid or a synthetic tanning agent. Synthetic tanning agents generally fall into three chemical groups:

Firstly, the so called auxiliary tans which are usually strong simple organic acids.

Secondly, combination tans which are generally sulphonic acids of complex phenolic materials.

Thirdly, exchange or replacement tans which are weakly acidic polymeric derivatives containing a large number of phenolic groups

Suitable tanning agents may be selected from cresol sulphonic acid ammonium salt (Neosyn RW), melamine formaldehyde sulphonate (Parnel A), a poly phenolic formaldehyde sulphonate (Suparex L) or a multiphenol formaldehyde sulphonate (Basyntan WL) as sold commercially for leather tanning or treatment. Other similar synthetic materials capable of reaction with protein (tanning action) may also prove effective when appropriately formulated. More recently formaldehyde reaction products of condensates and/or polymers of urea and melamine and mixtures thereof have been introduced for the manufacture of specialised leathers. These are also included in the general reference of acceptable agents for the purposes of the present invention.

The amount of tanning agent required in a concentrated product capable of dilution with water before use will generally be between 2 and 20% by weight of the total formulation. Sufficient amount of low molecular weight polar solvent, as described below, may be used to ensure solubility and stability of the tanning agent in the concentrated product.

Surfactant System

The composition of the surfactant system can be widely varied to suit the formulation, using widely available technology well known to those experienced in the art. The surfactant may be either anionic, cationic, amphoteric, zwitterion, nonionic or an alkyl pyrollidine and may be used in such concentration as to provide a surface tension low enough to ensure quick, complete wetting of household textile fibres whether clean or soiled. An end use surface tension at the air-water interface of between 25 and 32 dyne/centimetre is generally found acceptable. The surfactant(s) chosen must be compatible with biocidal constituents, safe towards soil repellent and/or stain repellent coatings commonly applied to household textile fibres and readily rinsible with water after use.

Examples of acceptable surfactants are sodium linear and branched chain dodecyl benzyl sulphonates, sodium alkyl naphthalene sulphonates, sodium alkyl (C8-18) sulphates, primary and secondary alkyl (C8-18) sulphonates, alkyl (C8-16) diphenyl oxide disodium sulphonates and alkyl (C3-8) mono and disodium sulphonates thereof, and like surfactants and their stable acidic forms. Many other types of surfactants can also be employed either singly or in combination, for example non-ionic, salts of half sulphosuccinate esters, amphoteric, zwitterion and higher molecular weight cationic surfactants.

In the present invention, anionic surfactants that produce a dry residue on evaporation of the detergent solution are preferred. However, any surfactant whether by itself or when formulated for use as a fabric detergent which can also be formulated to yield a dry, non-hygroscopic residue on evaporation of its solutions, can be employed in this manner.

Buffer Systems

The organic buffer system will be either the monovalent metal salt of an low molecular weight organic acid in combination with an partly neutralised organic acid such as acetic acid, propionic acid, glycolic acid, citric acid, tartaric acid, benzoic acid, p-hydroxybenzoic acid, sorbic acid and/or a chemically stable detergent acid such as dodecyl benzene sulphonic acid, yielding a pH in the range 2.5 to 7.0 at use dilution, the

final pH being chosen to optimise the reaction of the tanning agent with proteinaceous matter in the nature of biologically active allergens found in mite and insect faeces.

The acid or acids chosen must be acceptable in a fabric detergent and not induce either in aqueous solution or as a residue on drying any untoward action to either the ingredients of the total formulation, to individual fibres or to woven domestic fabrics, especially carpets, over the normal life of the fabric.

The polar solvent of the water soluble type can be a single glycol, ketone, alcohol or pyrollidine commonly used in the production of liquid detergents for domestic and commercial cleaning. Examples of suitable solvents, which must also be non-destructive to protective coating on fibres, are ethylene glycol, diethylene glycol, triethylene glycol, diethylene glycol monoethylether, diethylene glycol monopropylylether, dipropylene glycol, dipropylene glycol monomethylether, 3-butoxy butanol, hexylene glycol, ethanol, isopropanol, butanol, benzyl alcohol, phenoxyethanol, pentanone, and pyrollidones, eg n-methyl pyrollidine, and like materials. The amount required will generally be in the range 5 to 50% of a concentrated formulation or as required to act as a co-solvent of the tanning agent employed.

Additional components may be chelating agents, soil dispersants, preservatives such as aldehydes and complex ketones, biocides where compatible, such as tea tree oils and other naturally derived terpenes, preferably volatile molecules, insecticides and stain blocking resins. Perfumes and dyes compatible with the general chemical systems involved may also be employed at the discretion of the formulator.

The components of the composition may be formulated with either synthetic or natural tanning agents with only minor adjustment to polar solvent levels and the pH. Which surfactant is chosen depends on whether or not the cleansing composition is intended, for example, as a low foaming formulation for use with the pressure water injection carpet cleaning machines. Alternatively, a suitable surfactant may be chosen to provide, for example, a foaming formulation intended for application by bonnet (rotary) cleaning methods where, optionally, carbon dioxide or nitrogen gas are also injected into the spinning brush or cleaning pad.

It should be emphasised that either hot or cold cleaning method may be employed in order to provide an environment within the pile of carpets conducive to killing living

mites and other insects and vermin that are sensitive to low and high temperatures. Liquid nitrogen, for example, has been used to spray carpets as a quick method of assuring destruction of living organisms, insects and mites capable of causing recognisable medical problems either after or during cleaning. This approach may also be adopted with the methods of the present invention, where appropriate and practical.

The method of the present invention, which makes use of the inventive composition and other compositions described herein, is suitable for cleaning, sanitising and disinfecting carpets and other household fabrics in order to render them free of soiling matter, insects, mites and other common vermin and microorganisms. Although the application in a single step of the composition of the invention achieves a desirable result in terms of the level of hygiene and degree of neutralisation of potential allergens of the treated fabrics, it is advantageous to combine such a treatment with other treatments which can prevent future infestation of the fabrics with undesirable organisms and/or prevent their re-growth, thus preventing accumulation within the fabrics of undesirable allergenic substances. The preferred method of using the composition of the present invention, aimed at achieving a high level of hygiene of treated fabrics, which is sustainable over a long period of time, comprises the following three simple steps which can be incorporated, for example, into a normal commercial cleaning procedure.

(l) Apply ALLERSPRAY to initiate soil release and promote soil and allergen removal (or inactivation/neutralisation).

(2) Rinse by injection method with potable water, either hot or cold, to remove displaced soil and surplus chemicals. If more convenient the rinsing step can be carried out at room temperature but a heated rinse, for example water heated to above 65°C is strongly preferred, being more efficient for soil removal. The carpet pile, or other fabric, will be rendered as dry as possible with extraction equipment or allowed to dry overnight if inadvertently overwetted during rinsing.

(3) Apply the biocidal treatment which consists in the controlled application of a special biocidal composition (also referred to herein as ALLERTRETE), preferably in the form of a heated solution, in a dose controlled manner.

Together these treatments will yield fabrics that are not only visually clean but are also free from biologically active microbes and insects or other living vermin. The process

will also remove or otherwise inactivate the major allergens in the carpet. Regrowth or reinfestation will be controlled by residual chemicals on fibres.

Biocidal Treatment

After cleaning and rinsing carpet or other household fabrics, the biocidal composition (ALLERTRETE) is applied either by hand sprayer or, preferably, by means of the equipment listed below, or by equivalent means. The biocidal composition may comprise one or more biocidally active chemicals and one or more surfactants and/or solvents, to assist in the dissolution and penetration of the biocidal chemicals. The preferred components, which may singularly or in combination comprise the biocidal composition, are as follows:

1 A solvent-based acaricidal system with the ability of achieving quick knock-down of living mites and also of destroying or otherwise render infertile dust mite eggs. The solvent will also act as a volatile carrier for the other ingredients listed as follows.

2 An insecticide which will prevent, over extended periods of time, the development of insect populations within carpet or other fabric pile.

3 One or more acaricidal chemicals to both assist in the immediate knock-down of living dust mite populations and inactivate or destroy mite eggs, leaving the fabrics with substantially reduced mite population, and residual action to limit reinfestation after application of the treatment.

4 A biocidal growth regulator that will act as a further deterrent to the development of both microbial, insecticidal and mite populations over extended periods of time.

5 One or more effective biocides with good residual disinfecting properties which will further act to kill vegetative microbes and act as an inhibitor of future microbial growth, in particular the fungal species *Penicillium, Aspergillus, Alternaria, Cladosporium* species of moulds that are a vector in dust mite ecology.

6 An emulsifier-surfactant system to either emulsify solvent based formulations or to solubilise lesser quantities of acaricidal solvents in an aqueous solution. In the latter case it may also be necessary to use small quantities of low molecular weight polar solvents as listed above to achieve complete solubility, which would be considered in these instances as part of the total surfactant system.

Solvent-based acaricidal system

It has been demonstrated during our research that a series of aromatic and cyclic solvents have acaricidal properties. The most important are the terpenes either naturally or synthetically derived typified as being those derived by distillation on natural occurring essential oils. The more important but by no means exclusive members of this series of chemicals are those derived from distilled eucalyptus oils, pine oils, oils of melaleuca, citrus oils and camphor oils. Many fractions of these oils are available commercially composition being varied according to the geographical area from which the basic oil is derived, climatic conditions during growth and the method of refinement, fractionation or synthesis.

Our investigation have shown that British Pharmacopoeia Grade eucalyptus oil, and tea tree oil conforming to Australian Standard 2782-1985, are highly effective. Other common terpenes such as pinene, terpinolene, terpineol, dipentene, limonene and terpinene are also varyingly effective as acaricides. These solvent provide the vehicle and quick knock-down constituents in these formulations. They are most effective when appropriately emulsified in aqueous solution in the concentration of from 0.05 to 1.0% of solvent in an aqueous solution at use strength.

Acaricidal effectiveness of terpene solvents is increased with temperature, the preferred treatment temperatures being in excess of normal room temperature, eg, above 30°C, preferably up to 50°C of greater.

Insecticide

The preferred insecticides are the pyrethroids both natural and synthetic. Maximum safety to humans, particularly young children, is a vital criteria for selection. Natural pyrethrum and Permethrin are therefore a preferred ingredient. All pyrethroids are readily soluble in terpene solvents. The amount of pyrethroid required depends upon the ultimate use of such products but is generally in the amount of 0.025 to 1.0 percent at use dilution in the formulations herein disclosed. As will be seen from examples to follow, a typical concentrated product will contain from 10 to 40% by weight of Permethrin.

Acaricidal chemicals

A number of common chemicals have been shown to be acaricidal when appropriately formulated. This includes some pyrethroids. Benzyl alcohol, methyl and

ethylbenzoate, benzyl benzoate, phenyl salicylate, benzyl salicylate, 2-phenylphenol, p-chlormetacresol, 2,5-dichloro-4-bromophenol are also effective either alone or in combination. Several of these phenolic molecules are also capable of formulation into good disinfectants and/or antiseptics, especially when combined with terpenes and an appropriate emulsifier. Phenylethanol and 2-phenoxyethanol have also been demonstrated to exert strong acaricidal properties when applied to fabrics in adequate quantity. Most pyrethroids, particularly the synthetic pyrethroids, are strongly active as acaricides against house dust mites, particularly Permethrin.

After extensive investigation we have found that a combination of Permethrin and benzyl alcohol and/or eucalyptus solvent will give immediate kill of dust mites while Permethrin retains residual activity for extended periods of time provided it is not excessively bound to a surface either by absorption into the surface of fibres, such as wool and nylon, or by binding into surface films which limit or reduce the bioavailability of the pyrethroid. However, it is possible to substitute one or more of the acaricidal molecules listed herein where the alternative exhibits a particular biocidal benefit - for example as an fungicidal agent.

Biocidal Growth Regulator

The inclusion of a microbial growth inhibitory chemical such as 2-phenylethanol in small quantities has been shown to significantly reduce or inhibit microbial growth for such time as the chemical persists in the environment in which it is applied to a surface. 2-phenylethanol is quite effective as an inhibitor of DNA synthesis in quantities of 0.25% without affecting protein and RNA synthesis and can be employed as a component of a volatile (eg. terpene) carrier solvent. This is particularly beneficial in preventing regrowth of fungi and moulds after wet cleaning, which are major elements in the food chain of dust mites. Other non-toxic bacterial growth inhibitors of both natural and synthetic origin can also be incorporated provided they are economically feasible.

Some of the other biocides shown to possess these latter properties and which are used for food preservation, therefore being safe to humans if ingested in small quantity, are sodium diacetate, sodium benzoate, sodium propionate, potassium sorbate, methyl parahydroxy benzoate and sodium nitrite. Of these sodium benzoate is preferred due to its compatibility with textile fibres and the other ingredients in these formulations. The

quantity required will depend on the fabric weight to be treated and the chemical nature of the fabric but will generally be in the range of 0.05 to 1.0% by weight of the total formulation disclosed herein.

Biocide

As carpet and upholstery fabrics can accumulate a very wide range of microorganisms, some of which vary widely in their response to chemical biocides, it is strongly advisable to have a multi component biocidal system in such formulations. As will have been noted several of the ingredients discussed above have biocidal properties. Our research has clearly demonstrated that the use of one or more non-specific reacting type biocide is highly advantageous. The proton donor type biocides 6-Acetoxy-2,4-dimethyl-1,3dioxone (Giv-gard DXN, Givaudan Inc. USA,) and 2-n-Octyl-4-isothiazolin-3-one (Kathon LM, Rhom & Haas Inc. USA), and a number of like materials can successful be used as wide spectrum fabric biocides. Others we have evaluated in these circumstances are the phenols, 2-phenylphenol and 2,2'-methylene-bis(4-chlorphenol) (Dichlorophen), 2-Bromo-2-nitropropane-1,3-diol (Myacide, Boots, Ltd, UK) and some quaternary ammonium compounds, in particular lauryl dimethyl ammonium chloride. The amount required will vary with the circumstances of use but will generally lie in the range 0.01 to 5.0% by weight depending on the particular molecule and the pH at which it is applied. For reasons of human and fibre safety, a near neutral pH is desired.

Emulsifier-Surfactant System

Surfactants to be used in this composition are required to be safe and effective wetting agents on textile fibres, safe to humans and the general ecology, readily biodegradable, odour free, which dry to a non-hygroscopic residue and which are compatible with the biologically active constituents contained in products formulated from information herein disclosed. Clearly, they must also effectively solubilise or emulsify the carrier solvent(s) for these preparations and not diminish the biocidal mechanisms of the individual constituents.

Anionic surfactants are preferred where they can be successfully incorporated into acceptable products; in particular those which are salts of monovalent metals sodium, lithium and potassium, although in some conditions the amine or an ethanolamine salts may be preferred as an emulsifier. The lithium salt of lauryl (coco) sulphuric acid is a

preferred surfactant for use with biocides for use on fabrics. as it frequently contributes (synergises) the action of chemical biocides due to the presence of the lithium ion in the surface active phenomenon involved

Common nonionic, cationic (quaternary ammonium), amphoteric, zwitterion, and alkyl pyrollidine surfactant can be chosen for optimising specific formula variants within this specification

The quantity of surfactant, whether used singularly or in mixed surfactant systems, can be widely varied but in total is generally in the range 0.25 to 10.0% by weight of the total concentrated formulation.

In an alternative method of treating furnishing fabrics, the biocidal composition, ALLERTRETE, can be applied as a single treatment after normal injection cleaning. Significantly reduced quantities of allergens remaining after wet cleaning will as a result of treatment with ALLERTRETE, progressively disappear over short periods of time because re-infestation with and further growth of common microbes and pests is prevented by the treatment.

The application of ALLERTRETE provides a long acting, residual chemical treatment with the ability to inhibit or prevent re-growth of microbes and other living matter within carpet over extended periods (eg, a minimum of one year after treatment), thus substantially reducing the potential health hazard arising from the accumulation in the household fabrics of allergenic materials. This is a parallel step in carpet maintenance to the application of treatments currently applied to carpet after cleaning to provide either stain and/or soil repellency, antistatic treatment, deodorising, disinfecting or perfuming. It may be carried out as either a very cold or hot solution treatment.

One of the advantages of the cleansing compositions and methods disclosed herein is that the treatments can be applied by means of common cleaning equipment in normal cleaning (economical) times while achieving a previously unattainable standard of hygiene and visually cleanliness of carpets and other furnishing fabrics. The additional and highly beneficial advantage of the compositions and methods of the present invention is their ability to prevent re-growth of mites, microbes and other allergen producing living matter within furnishings over extended periods.

As has been demonstrated in practice, to clean and at the same time render a carpet and other fabrics fully hygienic is unlikely to be achieved by a single chemical or a single application. Too many practical variables must be surmounted for this to occur at the present stage of technology. However, it has now been shown that it is possible and practical to achieve high levels of cleanliness and hygiene of furnishing fabrics by a simple and economical extension of normal commercial cleaning processes, involving the use of specialised cleansing and biocidal compositions described herein. These highly desirable results have been achieved using chemicals in combinations which are neither injurious to humans, carpet, household furnishing fibres and dyes and to equipment used to apply the chemical products described in this specification.

The equipment required to apply these compositions is readily available commercially. That which is best suited for use in different aspects of the present invention is as follows:

1 Surface cleaning with a rotary spinning bonnet or carpet brush fitted with a detergent tank and flow control valve and, optionally, fitted with an inlet to dispense freezing carbon dioxide or nitrogen gas into the pile of carpeting.

2 An water injection carpet cleaning machine which is capable of heating water or commercial cleaning solvent to 95 to 100°C, fitted with flow control valves to regulate the volume of liquid being sprayed or flowed under pressure into carpet pile. The machine may either be portable or truck mounted. A number of versions of such machines are readily available.

3 Carpet cleaning and spot removal machines which generate wet steam at temperatures above 100°C which inject wet stem into carpet pile though a wand, which is fitted with either a liquid tank and flow control valve to meter a controlled quantity of chemical into the vapour stream; or alternatively, a separate mobile tank fitted with a chemical proportioning device to pump a controlled quantity of chemical into the vapour stream from the steam generating machine.

4 Any heated injection machine which produces water for injection into carpet pile at a controlled temperature in excess of 50°C, which may be either portable or truck mounted.

5 A portable sprayer of adequate capacity fitted with an appropriate spray nozzle capable of a regulated spray output at constant pressure either hand or motorised.

The invention will now be illustrated by way of examples which are not intended to nor should they be construed so as to limit the scope thereof.

EXAMPLES

Example 1. Low foaming-type composition I

To 600 gram of soft water add in order 100 grams of food-grade tannic acid, 250 grams of diethylene glycol monoethyl ether, 25 grams of dodecyl benzene sulphonic acid (detergent grade) and 10 grams of nonionic surfactant Teric 9A6 (ICI Australia Ltd), then 15 grams of benzoic acid. Neutralise with potassium hydroxide to a pH 3.0 to 3.5 (usually less than 1.0% by weight, depending on the grade of detergent acid used).

Example 2. Low foaming-type composition II

To 450 grams of soft water add in order and dissolve before the next addition: diethylene glycol monoethylether 220 grams, tannic acid 20 grams, citric acid 60 grams, cresol sulphonic acid ammonium salt (Neosyn RW, Cyanimid Inc., USA) 20 grams, isopropyl alcohol 100 grams, tea tree oil 15 grams, sodium hydroxide to pH 3.0 to 3.5, water 65 grams, Dowfax 3S3 30 grams and Teric 12A12 20 grams.

The surfactant system in formulations of Examples 1 and 2 are intended as low foaming therefore suitable for use with pressure water injection carpet cleaning machines.

Example 3. Foaming-type composition

To 578 grams of soft water is added 50 grams of (Neosyn RW, Cyanimid Inc., USA,) followed by 320 grams of dipropylene glycol mono methyl glycol then 50 grams of benzyl alcohol then 25 grams of n-methylpyrollidone followed by 45 grams of lithium lauryl sulphate (30% solution) then 5 grams of lauryl isopropanolamide. Dissolve each in turn then add in order 27 grams of glycolic acid (70%) then lithium carbonate to adjust the pH of the solution to 3.5 to 4.0.

Other synthetic tanning agents such as those referred to above can alternatively be incorporated into this formulation, with minor adjustment to polar solvent level and pH. Other tanning agents in general should perform a similar function. The surfactant chosen for this formulation is a foaming type designed for application by rotary brush, pad or bonnet cleaning method where, optionally, carbon dioxide or nitrogen gas are injected into and therefore through the spinning brush, bonnet or cleaning pad during cleaning to provide agitation and cooling to the cleaning solution.

Example 4.

To 875 gram of soft water is added in order: 100 gram of multiphenol formaldehyde sulphonate (Basyntan WL, BASF, Germany) 10 grams of Nansa SSA-L linear dodecyl benzene sulphonic acid (Albright & Wilson Australia) and 5.0 grams of citric acid. The pH of the solution is adjusted to 4.5 by the addition of 50% sodium hydroxide solution.

Example 5.

To 820 grams of soft water is added 80 grams of melamine formaldehyde sulphonate (Parnel A, Yorkshire Dyeworks, UK), then 12.5 grams of glycolic acid, 15 grams of citric acid, 10 grams of Petro 22 (Witco Corporation Inc, USA) and pH adjusted by slowly adding 50% sodium hydroxide to 2.5 to 3.5. 2.5 grams of glyoxal and 10 grams of formaldehyde is then added as a preservative and disinfectant followed by 0.25 grams of a suitable blue dye, eg, Polar Brilliant Blue.

Example 6.

To 860.5 grams of soft water is added 50 grams of cresol sulphonic acid ammonium salt (Neosyn RW, Cyanimid Inc,USA) followed in sequence by 50 gram of Nansa SSA-L, 15.0 grams of Belaloid 211 polyacrylic acid solution (Rhone Poulenc Australia) and 20 grams of glycolic acid. The pH is then adjusted to 3.5 to 4.5 with sodium hydroxide. Into this mixture is slowly introduced 3.5 grams of tea tree oil conforming to Australian Standard AS 2782-1985 mixed with 1.0 gram of lemongrass oil and stirring continued until solubilized.

Example 7.

To 820 grams of soft water is added 25 grams of polyphenolic formaldehyde sulphonate (Suparex L, Hodgson Chemicals Ltd, UK), 100 grams of Nansa SSA-L and 25.0 grams of tartaric acid. The pH is adjusted to 4.0 to 4.2 by the addition of sodium hydroxide, then 3.0 grams of ethylenediamine tetraacetic acid slowly added. 10.0 grams of Petro 22 is then incorporated followed by 15 grams of d-limonene. 1.0 gram of Polar Brilliant Blue dye is added to the solution.

Example 8. General Biocidal Fabric Detergent

	% by weight
Eucalyptus BP grade (75% 1,8 Cineol)	78
Dodecylbenzene monoethanolamide	15
Coco monoethanolamide	6
Myacide	2

Example 9. Insecticidal-Miticidal Fabric Treatment

	% by weight
Eucalyptus BP grade	54.5
Permethrin	25.0
Teric N9, ICI Australia Ltd	8.5
Lithium lauryl ether sulphate, (50%)	6.0
Pentanone	2.5
GivGard DXN	3.5

Example 10. Insecticidal, Acaricidal, Disinfectant Treatment

	% by weight
Eucalyptus BP grade	53.5
Tea Tree Oil, (Australian Standard 2782-1985)	7.5
Pyrethrum	15.0
Benzyl alcohol	5.0
Dipropylene glycol mono methyl ether	8.5
Dowfax 3B2, (Dow Chemical Inc. USA)	4.5%
Teric 9A6, (ICI Australia Ltd)	2.0
Kathon LM, (Rohm & Haas Inc. USA)	2.0
Isopropanol	2.0

Example 11. Insecticidal. Acaricidal. Disinfectant Treatment

	% by weight
Eucalyptus BP grade	20.0
d-Limonene, food grade	20.0
Permethrin	15.0
Diethyleneglycolmonoethylether	11.0
Isopropanol	16.5
Parachlormetacresol BP grade	1.5

Lithium lauryl sulphate, (30%)	10.0
Lauric diethanolamide	4.0
GivGard DXN	2.0

Example 12. Insecticidal, Acaracidal, Bioinhibitory Treatment

	% by weight
Eucalyptus BP grade	52.8
Terpineol	13.5
Methyl benzoate	5.5
2 phenylethanol	2.5
Sodium benzoate	2.5
Kathon LM	2.5
Hexylene glycol	15.0
Petro 22(alkylnaphthalene sulphonate)	2.2
Dodecylbenzenelithiumsulphonate	2.5
Teric 9A6	1.0

The pH of the aqueous solutions of the above formulations for the biocide treatment compositions is adjusted before use to 5.5 to 9.0 by the controlled addition of either sodium, potassium or lithium hydroxide or ethylenediamine tetraacetic acid or citric acid. The amounts required are insufficient to make a significant impact on the concentrations of the components as outlined above.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A composition comprising:

(a) a natural or synthetic leather tanning agent,

(b) a surfactant, and

(c) a buffer system comprising one or more non-oxidising acids, which is capable of maintaining the pH of the composition when in solution between 2.5 and 7.0..

2. A composition according to claim 1, wherein the tanning agent is selected from the group consisting of tannic acid, cresol sulphonic acid salt, melamine formaldehyde sulphonate, polyphenolic formaldehyde sulphonate and multiphenol formaldehyde sulphonate.

3. A composition according to claim 1 or claim 2, wherein the surfactant is anionic, cationic, amphoteric, zwitterionic, nonionic or an alkyl pyrollidone.

4. A composition according to claim 3, wherein the surfactant is selected from the group consisting of sodium linear and branched chain dodecyl benzene sulphonates, sodium alkyl naphthalene sulphonates, sodium alkyl (C8-18) sulphates, primary and secondary alkyl (C8-18) sulphonates, alkyl (C8-16) diphenyl oxide disodium sulphonates and alkyl (C3-8) mono and disodium sulphonates thereof, and their stable acidic forms.

5. A composition according to any one of the preceding claims, wherein the buffer system is and organic buffer system comprising a monovalent metal salt of a low molecular weight organic or hydroxy organic acid in combination with a partly neutralised organic acid.

6. A composition according to claim 4, wherein the organic acid is selected from the group consisting of acetic acid, propionic acid, glycolic acid, citric acid, tartaric acid, benzoic acid, p-hydroxybenzoic acid, sorbic acid and a chemically stable detergent acid.

7. A composition according to claim 5, wherein the detergent acid is dodecyl benzene sulphonic acid

8. A composition according to any one of the preceding claims, further comprising a polar solvent

9. A composition according to claim 8, wherein the polar solvent is a glycol, ketone, alcohol or a pyrollidine based solvent or a mixture thereof.

10. A composition according to claim 9, wherein the polar solvent is selected from the group consisting of ethylene glycol, diethylene glycol, triethylene glycol, diethylene glycol monoethylether, diethylene glycoi monopropylylether, dipropylene glycol, dipropylene glycol monomethylether, 3-butoxy butanol, hexylene glycol, ethanol, isopropanol, butanol, benzyl alcohol, , phenoxyethanol, pentanone, n-pyrollidone and n-methyl pyrollidone.

11. A composition according to any of the preceding claims, further comprising a biocidal composition comprising one or more natural or synthetic terpene solvents, an insecticide, one or more acaricides, one or more biocidal growth regulators and an emulsifier/surfactant.

12. A composition according to any one of the preceding claims, wherein the composition is a concentrated solution requiring dilution before use.

13. A method of cleaning and/or reducing allergen load of furnishing fabrics comprising the step of treating the fabric with a composition according to any one of claims 1 to 12.

14. A method according to claim 13, further comprising the steps of rinsing the fabric with water and applying a biocidal treatment comprising one or more natural or synthetic terpene solvents, an insecticide, one or more acaricides, one or more biocidal growth regulators and an emulsifier/surfactant.

15. A method according to claim 13 or claim 14, wherein the first step is the application of the biocidal treatment, followed by rinsing with water and the application of a composition according to any one of claims 1 to 10.

16. A method according to any one of claims 13 to 15, wherein the rinsing step is performed with heated water.

17. A method according to any one of claims 13 to 15, wherein the biocidal treatment is applied as a heated solution.

18. A method according to any one of claims 14 to 17, wherein the one or more terpene solvents are selected from distilled eucalyptus oils, pine oils, oils of melaleuca, citrus oils, camphor oils, pinene, terpinolene, terpineol, dipentene, limonene and terpinene.

19. A method according to claim 18, wherein the one or more terpene solvents are present in a concentration of from 0.05 to 1.0% by weight at use dilution.

20. A method according to any one of claims 14 to 19, wherein the treating composition or rinsing composition comprises a natural or synthetic pyrethroid insecticide.

21. A method according to claim 20, wherein the insecticide is present in a concentration of from 0.025 to 1.00% by weight at use dilution.

22. A method according to any one of claims 14 to 21, wherein the treating composition or rinsing composition comprises one or more acaricides selected from natural or synthetic pyrethroids, benzyl alcohol, methyl benzoate, ethyl benzoate, benzyl benzoate, phenyl salicylate, benzyl salicylate, 2-phenyl phenol, p-chlorometacresol and 2,5-dichloro-4-bromophenol.

23. A method according to any one of claims 14 to 22, wherein the treating composition or rinsing composition comprises one or more biocidal agents or growth regulators are selected from 2-phenylethanol, sodium diacetate, sodium benzoate, sodium propionate, potassium sorbate, methyl parahydroxy benzoate, sodium nitrite and a proton donor type biocide.

24. A method according to claim 23, wherein the biocide is selected from 6-acetoxy-2,4-dimethyl-1,3-dioxone, 2-n-octyl-4-isothiazolin-3-one, 2-phenylphenol, 2,2'-methylene-bis(4-chlorophenol), 2-bromo-2-nitropropane-1,3-diol and lauryl dimethyl ammonium chloride.

25. A method according to claim 23 or claim 24, wherein the biocidal growth regulator is present in a concentration of from 0.01 to 5.00% by weight at use dilution.

26. A method according to claim 25, wherein the biocidal growth regulator is present in a concentration of from 0.05 to 1.00% by weight.

27. A method according to any one of claims 13 to 26, wherein the emulsifier/surfactant is nonionic, cationic (quaternary ammonium), amphoteric, zwitterionic or an alkyl pyrollidone, or is selected from the group consisting of a sodium, lithium, potassium, amine or ethanolamine salt of lauryl (coco) sulphuric acid.

28. A composition, substantially as herein described with reference to any one of the Examples.

29. A method of cleaning and/or reducing allergen load of furnishing fabrics, substantially as herein described with reference to any one of the Examples.

DATED this 8th day of January, 1996
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